

June 21, 2013

Vaughn Koligian
Director Corporate Sustainability
Sun-Maid Growers of California
13525 South Bethel Avenue
Kingsburg, Ca 93631

Re: Sun-Maid Growers of California, Kingsburg Facility
Tentative Waste Discharge Requirements - Comments & Recommendations

Dear Mr. Koligian,

This letter provides technical comments and recommendations addressing specific items from the May 21, 2013 California Regional Water Quality Control Board (**Regional Board**) Tentative Waste Discharge Requirements (**TWDR's**) for Sun-Maid Growers of California (**Sun-Maid**).

These recommended changes to the TWDR's were developed through the process of multiple meetings and correspondence with the Water Board Fresno staff and Sun-Maid staff, technical research and findings, and field visits of the processing facility and land application areas.

This letter is organized by listing the issue of concern, followed by a recommendation, with background and justification for the recommendation.

TENTATIVE WASTE DISCHARGE REQUIREMENTS

Issue 1 – Wastewater Application Cycle Duration Limit:

Page 18 – Paragraph 3. Land Application Area Specifications D.3.- "Wastewater shall be applied to the Land Application Areas with appropriate resting periods for the proposed cycle average (i.e. three day cycle average; application on day one, rest days two and three, repeat) between each wastewater application. The minimum application cycle shall be three days."

The three day cycle application limit for the Biochemical Oxygen Demand (**BOD₅**) loading rate does not take into consideration the agronomic interactions of the soil, water, and crops and the physical constraints as well as the benefits of the sprinkler irrigation system.

Recommendation:

Remove all requirements to limit the frequency of applications to a set number of days, and remove all references to a specific cycle with specific rest periods days in the TWDR's and Tentative Monitoring and Reporting Program (**TMRP**).

A total of 35 uniform application zones of approximately 2.3 acres each have been identified on Sun-Maid's proposed land application area. It is recommended that an application period not to exceed 120 minutes per zone with a rest period of two times the application period be implemented.

Background and Justification:

Limiting applications to a minimum three day cycle is not conducive to best management practices and is unacceptable for the following reasons:

1. A BOD₅ cycle average loading rate of 150 lbs/ac/day is specified in the TWDR's and significantly limits wastewater applications by comparison to Sun-Maid's existing WDR's. Because a BOD loading limit is specified, this minimum duration limit is not needed.
2. The existing and proposed fields will not be irrigated by flood irrigation. Sun-Maid utilizes sprinkler systems for irrigation.
 - a. Sprinkler irrigation promotes greater air filled soil pore space during application. Under sprinkler irrigation, water enters soil through fine pores only leaving large pores available for CO₂-O₂ exchange.
 - b. Saturated conditions are avoided with sprinkler irrigation applications of more frequent but smaller amounts.
 - c. Sprinkler systems have a higher distribution uniformity (about 80%) than flood irrigation systems (65%).
 - d. With a sprinkler system, the wastewater is applied throughout the field more evenly, which reduces the potential for deep percolation below the root zone. In contrast, with a flood irrigation system the irrigation wetted surface is used to transport wastewater across the field. During flood irrigation, soils can become saturated interrupting gas exchange. With a sprinkler application, water enters soil through only fine pores, leaving large pores available for CO₂-O₂ exchange so that gas exchange continues throughout the application. Soils do not become saturated so aerobic decomposition can continue uninterrupted.

- e. Sprinkler irrigation systems have a much higher irrigation efficiency than flood irrigation systems, which means less water is applied to meet crop consumptive use.
- f. The USDA Natural Resources Conservation Service (Soil Conservation Service), National Engineering Handbook Section 15 Irrigation, Chapter 11 Sprinkle Irrigation, states the benefits of sprinkler irrigation versus flood irrigation.
 - i. *"Small, continuous streams of water can be used effectively."*
 - ii. *"Light frequent watering can be efficiently applied"*
- 3. With a three day cycle limit, larger volumes of water must be applied in a single day, which has a greater probability for deep percolation below the rootzone, which is not favorable.
 - a. Smaller more frequent irrigations, reduces the volume of water applied each day, and reduces deep percolation.
 - b. For example, applying one inch of water every three days has a greater probability of deep percolation below the rootzone than applying 1/3 inch every day.
- 4. The California League of Food Processors (CLFP) Manual of Good Practice for Land Application of Food Processing/Rinse Water states that the infiltration/drainage cycle time can be ignored for sprinkler irrigation, and clearly states:
 - a. *"Sprinkler application is more conducive to re-oxygenation of the soil than flood irrigation because the dosing is more uniform, can be much shorter in duration and does not necessarily result in saturated conditions."*
 - b. *"Sprinkler irrigation that minimizes ponding typically keeps the soil aerated and the soil moisture content somewhere between field capacity and saturation. Therefore, it is reasonable to ignore the infiltration/drainage time for sprinkler irrigation."*
- 5. Neutron probes are used to monitor soil moisture at various depths throughout the existing land application area. These readings dictate the timing and frequency of irrigations, based on actual soil moisture field conditions. Irrigation Water Management (IWM) is a best management practice for wastewater land application areas.
- 6. From the USDA NRCS Soil Survey, the site specific available water holding capacity for the predominant soil, Hanford fine sandy loam, on 3.5 ft of rootzone depth is 5.5 inches. This indicates sandy soil conditions, with a shallow rooted crop, which dictates the application of frequent smaller irrigations.
- 7. Using an industry standard maximum allowable depletion of 50%, 2.75 inches of pore space is available in the rootzone. This also dictates the need for better control of the water applications.
- 8. Peak evapo-transpiration in July is 0.30 inches/day (not adjusted for application efficiency) for a Sudan/Sorghum summer crop. Therefore applying smaller more frequent applications helps to reduce over irrigating below the rootzone.

9. Discharge onto any portion of the 81.1 acre Land Application Area is typically limited to 2 hours per day. This allows for adequate rest periods, tabulated by hours rather than by days, on each of the 35 irrigation zones within the 81.1 acres.
10. Shorter application periods will occur during periods of lower evapo-transpiration (winter months) while longer application durations (not to exceed 120 minutes/zone) will take place in the months of greater evapo-transpiration (summer months).

Issue 2 – Wastewater Constituent Concentrations:

This letter also serves as written confirmation from Sun-Maid to the Water Board that significant improvements and programs have been initiated by Sun-Maid to reduce the quantity of constituents in its waste stream that have the potential to impact water quality.

1. The use of sodium hydroxide based products for cleaning and sanitization has been discontinued by Sun-Maid. The facility has converted to using hydrogen peroxide or potassium hydroxide based products for plant cleaning and sanitization activities. Potassium based products discharged in the waste stream are a nutrient that will be utilized by the forage crops while sodium based products cannot be utilized by the plants and can impact groundwater. In the event Sun-Maid changes cleaning products in the future, the company will not resume using sodium based products.
2. The use of sodium hypochlorite as a sanitizer for Sun-Maid's source water has been discontinued. The facility has converted to using potassium hypochlorite. Potassium based products in the waste stream are a nutrient that will be utilized by the forage crops while sodium based products cannot be utilized by the crops.
3. The use of sodium hydroxide as a pH buffer for the waste stream sent to the Selma-Kingsburg-Fowler County Sanitation District (**SKF**) has recently been discontinued. The facility is currently buffering with calcium hydroxide and may evaluate the effectiveness of using potassium hydroxide for buffering purposes. The conversion will eliminate the sodium sent to the fields when that treated portion of the waste stream in Sun-Maid's holding sump is diverted from SKF to the reclamation fields. Additionally, the calcium hydroxide will be a beneficial soil amendment. In the event potassium hydroxide is selected, it is a nutrient that will be utilized by the forage crops. The sodium hydroxide cannot be used by the crops and it contributed to an increase in inorganic dissolved solids (**IDS**) levels.
4. New programs in Sun-Maid's facility have been implemented to reduce the volume and incidence of organic constituents entering the plant's waste stream. Specific activities include but are not limited to the physical removal of solids rather than washing them down the drain and changes in raisin processing and cleaning practices.

Issue 3 - Groundwater Monitoring Considerations:

The TWDR indicates Monitoring Well #1 (**MW-1**) was installed as a background well. The nitrate as nitrogen (**NO₃-N**) results from this well increased dramatically and the well may be compromised (damaged).

Recommendation:

Sun-Maid has agreed to replace damaged MW-1 and will do so at a location within the land application area that is mutually agreeable to the Regional Board. It should be noted the Statements and Findings in the TWDR regarding MW-1 may be incorrect or invalid.

Background and Justification:

On March 18, 2013, Sun-Maid engaged A&S Pump Service (**A&S**) to perform an evaluation of MW-1 including a video inspection to determine its condition. Based upon that inspection, A&S provided a written response to Sun-Maid on April 11, 2013 and under "Findings/Conclusion" they reported "MW-1, in its present condition, will draw dirt and similar material when a water sample is taken. As such, the material being sampled will not be representative of the groundwater at that site."

CONCLUDING COMMENTS

We believe modifying the TWDR to include the provisions outlined in this letter will provide the means of effectively managing the discharge of wastewater to Sun-Maid's fields and protect the ground water quality.

Respectfully Submitted,



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